

CLAIMS

1. A rapidly opening pressure regulating valve comprising:
 - a main body provided with an inlet and an outlet of a fluid and a valve seat;
 - a valve member being composed of a main valve member having one end side and the other end side, and having a closing pressure-receiving surface that is in communication with the outlet, for receiving a pressure in a closing direction, and an opening pressure-receiving surface formed on the other end side, for receiving a pressure in an opening direction, which valve member is guided movably in an opening/closing direction by the main body, and a valve component that is mounted removably on the one end side through the inlet and opened and closed by being brought into contact with and being detached from the valve seat;
 - a channel for communicating the inlet with the other end side;
 - a biasing member for biasing the valve member in the opening direction;
 - a moving receiving portion that is interposed between a receiving member and the biasing member, the moving receiving portion being guided movably in the opening/closing direction, provided with a pressure-receiving surface for receiving a same pressure as the opening pressure-receiving surface, and generating a biasing force in the biasing means when moved to

a predetermine position in the opening direction;

a positioning portion provided in the main body so as to stop the moving receiving portion at the predetermined position;

pressure-sealing means including a sealing plate that is provided so as to close the channel; and

sealed pressure-releasing means provided in the main body, the sealed pressure-releasing means being constituted so as to supply a pressure in the channel to the opening pressure-receiving surface by breaking the sealing plate when operated,

wherein a pressure-receiving area for receiving a fluid pressure of the valve component that is seated in the valve seat, a pressure-receiving area of the closing pressure-receiving surface, a pressure-receiving area of the opening pressure-receiving surface, and a biasing force of the biasing member are determined so as to have a relationship in which the channel is communicated and the opening pressure-receiving surface receives a pressure in the opening direction, whereby the valve component portion is opened and a valve closing force that closes the valve component portion when a pressure in the outlet exceeds a predetermined pressure becomes larger than the biasing force, whereby the valve component portion is closed.

2. A rapidly opening pressure regulating valve comprising:
 - a main body provided with an inlet and an outlet of a fluid and a valve seat;
 - a valve member being composed of a main valve member having one end side and the other end side, and having a closing pressure-receiving surface that is in communication with the outlet, for receiving a pressure in a closing direction, and an opening pressure-receiving surface formed on the other end side, for receiving a pressure in an opening direction, which valve member is guided movably in an opening/closing direction by the main body, and a valve component that is mounted removably on the one end side through the inlet and opened and closed by being brought into contact with and being detached from the valve seat;
 - a channel for communicating the inlet with the other end side;
 - a biasing member for biasing the valve member in the opening direction;
 - a moving receiving portion that is interposed between a receiving member and the biasing member, the moving receiving portion being guided movably in the opening/closing direction, provided with a pressure-receiving surface for receiving a same pressure as the opening pressure-receiving surface, and generating a biasing force in the biasing means when moved to a predetermine position in the opening direction;

a positioning portion provided in the main body so as to stop the moving receiving portion at the predetermined position;

pressure-sealing means including a pressure-sealing member that is provided so as to close the channel; and

sealed pressure-releasing means provided in the main body, the sealed pressure-releasing means being constituted so as to supply a pressure in the channel to the opening pressure-receiving surface by keeping the pressure-sealing member open when operated,

wherein a pressure-receiving area for receiving a fluid pressure of the valve component that is seated in the valve seat, a pressure-receiving area of the closing pressure-receiving surface, a pressure-receiving area of the opening pressure-receiving surface, and a biasing force of the biasing member are determined so as to have a relationship in which the channel is communicated and the opening pressure-receiving surface receives a pressure in the opening direction, whereby the valve component portion is opened and a valve closing force that closes the valve component portion when a pressure in the outlet exceeds a predetermined pressure becomes larger than the biasing force, whereby the valve component portion is closed.

3. The rapidly opening pressure regulating valve of claim

2, wherein the pressure-sealing member is a sealing plate, the sealed pressure-releasing means comprising:

 a needle portion provided so as to be opposed to the sealing plate;

 a piston-like member for biasing the needle portion such that the needle portion penetrates the sealing plate by receiving a fluid pressure; and

 an operating portion formed so as to bias the piston-like member.

4. The rapidly opening pressure regulating valve of any one of claims 1 to 3, wherein the valve component comprises a contact portion that comes in contact with the valve seat; and

 a reinforcing portion for suppressing deformation of the contact portion, and the reinforcing portion is made of a material having a tensile strength of 200 N/mm² or more.

5. The rapidly opening pressure regulating valve of any one of claims 1 to 4, wherein an area of a region of the valve component that is opposed to the valve seat is the same as an area of the opening pressure-receiving surface.

6. The rapidly opening pressure regulating valve of any one of claims 1 to 5, wherein when the pressure-receiving area of the closing pressure-receiving surface is reduced, the

pressure-receiving area for receiving a fluid pressure of the valve component seated in the valve seat and the pressure-receiving area of the opening pressure-receiving surface are constant, and the relationship is maintained.

7. The rapidly opening pressure regulating valve of any one of claims 1 to 6, wherein the receiving member is constituted such that its inner circumferential surface can guide movement of the moving receiving portion in the opening/closing direction.

8. The rapidly opening pressure regulating valve of claim 7, wherein the receiving member and the main body are constituted so as to be capable of being thread-engaged with each other, and have contact portions other than engaged portions, which contact portions are formed to be tapered.

9. A rapidly opening pressure regulating valve comprising:
a valve member configured so as to be displaceable along an axis thereof; and
a main body formed integrally with a cylinder insert portion that is inserted in a high pressure gas cylinder and in which an inlet of gas is formed,
the rapidly opening pressure regulating valve comprising:
insert portion reinforcing means for increasing a

mechanical strength of the cylinder insert portion.

10. The rapidly opening pressure regulating valve of claim 9, wherein the cylinder insert portion includes a housed portion that is housed in a cylinder and an exposed portion that is exposed outside the cylinder, and

the insert portion reinforcing means reinforces a portion including a vicinity of a boundary between the housed portion and the exposed portion.

11. The rapidly opening pressure regulating valve of claim 9 or 10, wherein the insert portion reinforcing means comprises:

a reinforcing means main body portion provided across between both sides in the axis direction of the boundary;

a thread mechanism portion provided on one side in the axis direction of the boundary, for supplying a driving force to the reinforcing means main body portion toward the one side in the axis direction; and

a thread-advance preventing portion provided on the other side in the axis direction of the boundary, for preventing the reinforcing means main body portion from advancing while being threaded to the one side in the axis direction.

12. The rapidly opening pressure regulating valve of claim 11, wherein the reinforcing means main body portion is formed

in a cylindrical shape,

the thread-advance preventing portion is formed integrally with the reinforcing means main body portion and projects outward in a radial direction of the reinforcing means main body portion to be engaged with a cylinder insert portion, and

the thread mechanism portion has an inner threaded portion that is formed integrally with the inner circumferential portion of the cylinder insert portion, and an outer threaded portion that is formed integrally with the outer circumferential portion of the reinforcing means main body portion and that is thread-engaged with the inner threaded portion.

13. A fire extinguishing apparatus comprising:

an inert gas cylinder for storing inert gas for fire extinguishment;

the rapidly opening pressure regulating valve of any one of claims 1 to 12 in which the inlet of the main body is mounted on the inert gas cylinder,

wherein the fire extinguishing apparatus comprises a line for guiding the inert gas from an outlet of the rapidly opening pressure regulating valve to a fire extinguishment area.

14. A high pressure gas cylinder apparatus comprising:

a high pressure gas cylinder; and

the rapidly opening pressure regulating valve of any one of claims 1 to 12 in which the inlet of the main body thereof is mounted on the high pressure gas cylinder.

15. An apparatus for rapidly supplying a fluid comprising:
a fluid source for supplying a fluid; and
the rapidly opening pressure regulating valve of any one of claims 1 to 12 in which the inlet of the main body thereof is provided in the fluid source.